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ABSTRACT

This packet provides information on the balance between the endangered red-cockaded woodpecker and modern forestry in Texas. A set of classroom activities about the Red-cockaded Woodpecker and its habitat for grades 3-6, and a booklet, a pamphlet, and a poster are featured. Sections of the booklet include: (1) "The Red-cockaded Woodpecker"; (2) "Historic Range of the Red-cockaded Woodpecker in Texas"; (3) "Present Range of the Red-cockaded Woodpecker in Texas (1998)"; (4) "Why is It Vulnerable and Why is It Endangered?"; (5) "How Can We Bring Them Back?"; (6) "What is The Landowner Incentive Program?"; and (7) "Partners in Flight." Activity sections include: (1) "Prescribed Burning for the Red-cockaded Woodpecker"; (2) "Red-Cockaded Woodpecker Habitat Lap Sit"; (3) "What Would You Do?"; (4) "Wordfind"; and (5) "Red-Cockaded Woodpecker Math Activity." (CCM)

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Red-cockaded Woodpecker Classroom Activities

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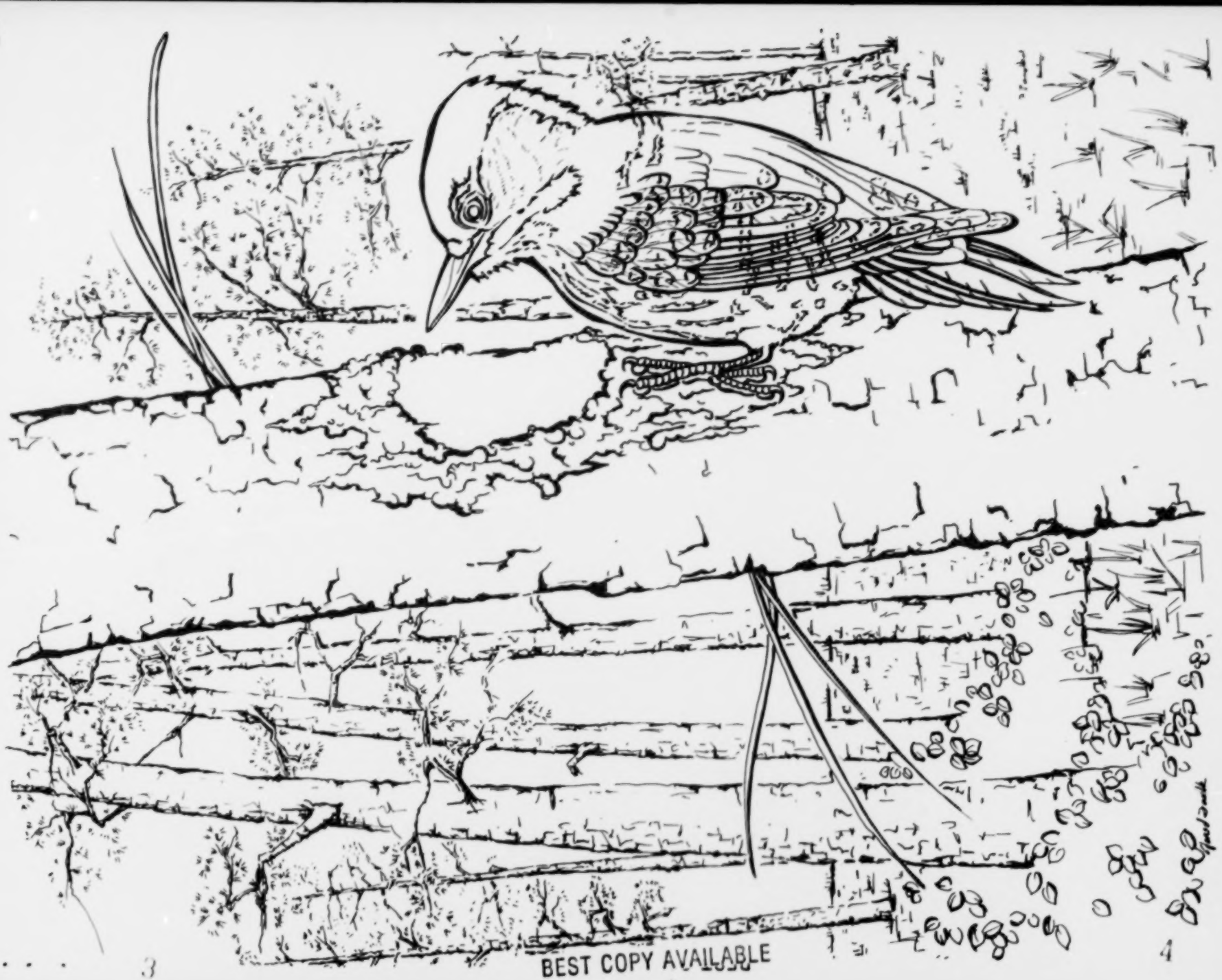

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"A HOME IN THE PINES"

Classroom Activity About The RED-COCKADED WOODEPECKER AND ITS HABITAT

This classroom activity for grades three to six is best used after students have already become familiar with the Red-cockaded Woodpecker's natural history (see other activities).

HABITAT is defined as the locality in which a plant or animal lives. In other words, it is the arrangement of food, water, shelter or cover, and space suitable to a species needs. Examples of what's included are places to find food throughout the year, places to rest and hide from predators and places to find a mate and raise a family.

WHAT IS YOUR PERSONAL HABITAT? Ask students to define their own personal habitat by identifying what they need to live from day to day. This includes a home, clean water to drink, place to buy food, school, places for entertainment, and medical and dental offices. (The teacher may want to help students draw boundaries of a few habitats on a city or county map).

DISTRIBUTION RANGE is defined as the geographic area in which all members of a species and their habitat are found. The amount of space is highly variable from a few inches (in the case of a bacterium) to most of the land of the planet (the human being).

WHAT IS THE DISTRIBUTION RANGE FOR YOUR SPECIES? All people belong to the species *Homo sapiens* (our scientific name). How many individuals of your species are there in the world? (5.5 billion is the estimated world population). Even though people are often of different sizes and colors, we all belong to the same species. What is the distribution range of your species? Look at a world map and identify where the human species lives. In what areas don't humans live?

An **ENDANGERED SPECIES**, is an animal or plant that is in danger of becoming extinct. The loss of its habitat (living space) is often the reason why there aren't many individuals left.

The **Red-cockaded Woodpecker** has the scientific name *Picoides borealis*. There are probably less than 5,000 members of this species in the entire world. (Write and compare the numbers of humans and Red-cockaded Woodpeckers on the chalk board.) The Red-cockaded Woodpecker's habitat (where it lives) is **PINE WOODLAND.** The Red-cockaded Woodpecker was once found throughout the southeastern United States, including all of the East Texas Pineywoods. This was its **HISTORIC DISTRIBUTION RANGE** or where it used to be found. Today, Red-cockaded Woodpeckers are found in only about half of the area in Texas where they once occurred. Most of the Red-cockaded Woodpeckers in Texas are found on the National Forests, although some private timberlands also have good populations of these woodpeckers. (See diagram of historic and present ranges). Using the diagram, have a student go to the large classroom world and state maps and outline to the class the Red-cockaded Woodpecker's historic and present ranges. How does its present distribution range compare to that of the human species?

Within the Pineywoods region, what are the Red-cockaded Woodpecker's **HABITAT NEEDS**? Based on what you already know about the life history of the woodpecker, what specifically does this endangered species need to survive? Ask students to make a list. The list should include: open pine forests with widely-spaced pine trees; large, old pine trees where they can excavate their cavity holes; and pine forests where they can find food (food is insects).

LOSS OF HABITAT is the most severe threat to the survival of the Red-cockaded Woodpecker. What are some of the reasons habitat is gone? Ask students to think about what kinds of human activities alter natural areas. The following are the most important threats for this species. **LOSS OF OLD, MATURE PINES** due to modern forestry practices which favor smaller, faster-growing pines. **LACK OF PERIODIC FIRES**, which controlled the midstory hardwoods and kept the pinewoods open and suitable for the woodpeckers. Some **LOSS OF NATIVE PINEWOODS** has occurred because the land has been cleared to plant crops or grasses for grazing cattle. And finally, **URBANIZATION**, or the growth of towns and cities, has replaced some habitat with buildings and roads. A very important problem for the Red-cockaded Woodpecker and for most Texas endangered species is **LACK OF AWARENESS** about their natural history and habitat needs. Many people have never heard of the Red-cockaded Woodpecker.

PROBLEM SOLVING ACTIVITY

(This exercise should be done after students have become familiar with the Red-cockaded Woodpecker by completing other activities).

Instructions to the Students: Now that you have completed several activities in this unit you are now ready to be a **RED-COCKADED WOODPECKER BIOLOGIST**. You understand a great deal about the natural history of these woodpeckers and what they need to survive. As a biologist, you must now **MAKE RECOMMENDATIONS** to city, county, state, and federal officials about how to save this endangered species. Let's do an exercise to come up with some ideas.

Instructions to the Teacher: Break the class into groups and instruct them to spend fifteen minutes **BRAINSTORMING** ideas about how to help the Red-cockaded Woodpecker. Appoint a recorder for each group to list the five best ideas the group has. When time is up, reassemble the class and share ideas. As the teacher you may want to lead the student's suggestions toward the following management practices that are being used today to help save the Red-cockaded Woodpecker.

PROTECT EXISTING HABITAT

Red-cockaded Woodpecker habitat is being protected and managed within the National Forests of east Texas. State and federal resource managers are seeking new ways to protect and improve habitat for the woodpeckers.

HABITAT MANAGEMENT AND RESTORATION--WORKING WITH FEDERAL, STATE, AND PRIVATE LANDOWNERS

Some east Texas landowners are doing a good job of protecting Red-cockaded Woodpecker

habitat. State and federal conservation managers are working with landowners to restore habitat, as well as offering landowners a variety of options on how to manage their timber while also providing habitat for Red-cockaded Woodpeckers.

RESEARCH PROGRAMS

Texas Parks and Wildlife and U.S. Forest Service biologists are studying populations of Red-cockaded Woodpeckers in east Texas. Biologists count the woodpeckers and try to find new cavity trees. In an effort to provide more cavities for nesting, biologists insert artificial cavity boxes into pines located in suitable habitat. In just a few moments, the woodpeckers have available to them a cavity that would have taken them a year or more to excavate. In a technique called augmentation, woodpeckers are moved from areas of poor or declining habitat to more suitable habitat in an effort to start new family groups.

ENVIRONMENTAL EDUCATION

Everyone can help Red-cockaded Woodpeckers by learning about their natural history and conservation needs and sharing this information with others. Well informed students can teach their parents, brothers and sisters, and friends all about this fascinating bird. Understanding the life history of the Red-cockaded Woodpecker will help build support for efforts to help this endangered species survive.

Following the presentation of ideas and subsequent discussion, you may want to have the students **TAKE ACTION** and write to government officials or write a letter to the editor of the newspaper expressing their concerns for the Red-cockaded Woodpecker, along with the recommendations they have for saving this endangered species.

Prepared by
Texas Parks and Wildlife
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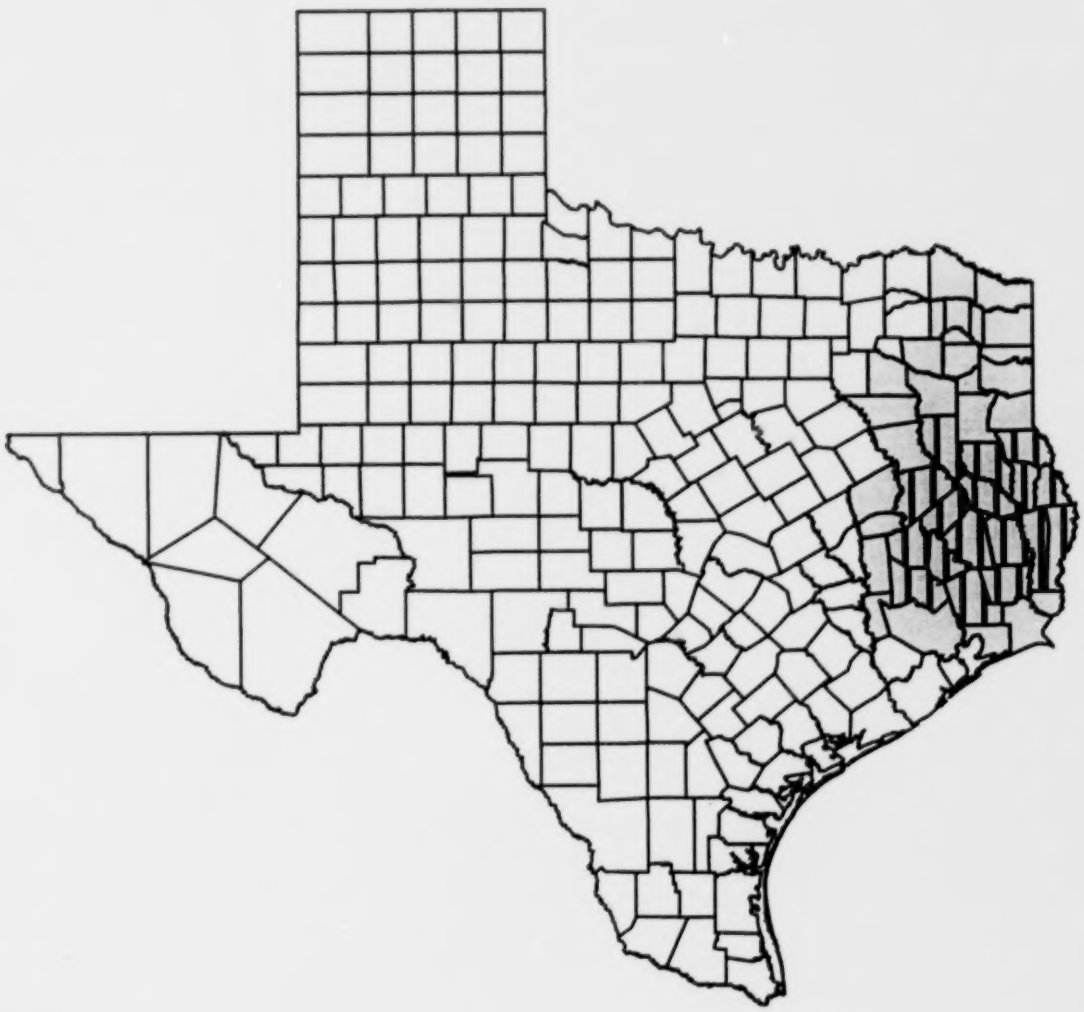
RED-COCKADED WOODPECKER DISTRIBUTION IN TEXAS



Present Range

Historic Range

Map only shows Texas range

Prescribed Burning for the Red-cockaded Woodpecker

Objective:
Students will be able to identify, describe and evaluate some possible positive and negative effects on wildlife (specifically the Red-cockaded Woodpecker) that result from forest fires.

Method:
Students brainstorm positive and negative effects of forest fires; conduct research; and create murals showing changes from fire in forest ecosystems, focusing on the effect of fires on the habitat of the Pineywood's Red-cockaded Woodpecker. Students may continue the activity by conducting a field investigation.

Background:
In managing public lands, government agencies for many years have been making a slow movement to change their attitudes toward forest and grassland fires. Whereas once all fires were suppressed or vigorously fought, today many fires are allowed to burn as part of a natural cycle within forest and grassland ecosystems. In remote areas, some agencies monitor lightning-ignited wildfires and allow them to burn as long as they stay within "prescribed" limits of fire behavior and location. However, wildfires are still aggressively fought near populated areas. In fact, there has been a movement to "prescribe" fires under some conditions and in some places in an effort to replicate natural cycles that contribute to maintaining healthy ecosystems.

When naturally occurring wildfires are suppressed, a dense hardwood midstory can develop in forests. A midstory of oaks and other hardwoods interrupts the Red-cockaded Woodpecker's line of flight into its nest. Too much brushy growth changes the open habitat conditions favored by the bird. If an area becomes too dense, the woodpecker will abandon its nest. Prescribed burning every 3 - 5 years mimics the natural fire regime and improves habitat for the woodpecker by removing midstory vegetation.

Such "prescribed burns" are planned and tended by qualified resource managers. Prescribed burns are frequently designed to reduce the fuel load in a given area. Reducing the fuel load in a forested area, for example, can prevent fires from getting so hot that they eliminate virtually all life forms and even scorch the soil. That is, fires every five to ten years in some forest types can clear the heavy underbrush without harming the larger trees in the forest. A major fire after a 50 year accumulation of brush and maturing timber, however, can cause intensely hot and destructive fires.

Objectives for use of fire as a management tool are variable. Objectives may include restoring fire's role in the natural cycle within a particular ecosystem; eradicating some plant species; and promoting the stimulation of plant species that are preferred food by some wildlife. In some area, fire is the most cost-effective tool to manage habitats.

Prescribed " burns" are planned and initiated by qualified professionals who are trained in using fire for resource management objectives. Prescribed fires are only employed after burn plans are approved. Those plans must specify objectives for the fire, location, size, type, how the fire will be started and controlled and how the smoke from the fire will be managed. Fire plans set limits for weather parameters which control how hot a fire burns and in which direction smoke dissipates. Fires outside of those limits will not be started. If the fire is started and the weather conditions change to go beyond these limits, plans call for putting out the fire.

Students may ask why- if some fires are helpful- the national symbol of firefighting agencies, Smokey Bear says, "Only you can prevent forest fires."

This message is aimed at humans causing fires by error and accidents, such as carelessness in camping situations. The message also warns us about the terrible destructiveness of arson-intentional fires set by people for malicious and mischievous purposes. Accidental and arson fires are often started near developed areas. They often occur during times of severe drought or high winds. This kind of wildfire can be terribly destructive. On the other hand, prescribed fires are lit under ideal weather conditions. They generally burn much cooler than wildfires that most often occur during extremely hot and dry times. Again, the only people who may be authorized to set prescribed forest and grassland fires are those who are fully qualified professionals, trained in the study of ecological systems to reinstate fire as a natural management tool. It is still correct, of course, that fires can have negative as well as positive effects. Forest products companies, for example, in most cases would rather harvest trees than see them burn.

If a fire is too large, too fast and too hot, wildlife can't easily move to safety. Individual animals may die or be displaced from their habitat. Short-term and long term loss of vegetation can have a variety of effects including loss of food and shelter for wildlife, and increase in silting and sedimentation in the waters.

There are, however, possible benefits as well-particularly in the case of those smaller burns that do not get exceedingly hot. For example, fires can:

- maintain and enhance fire-dependent habitats such as prairies, savannas, chaparral, jackpine forests, southern pine forests, boreal forests;
- provide habitats fore species primarily dependent on fire driven ecosystems such as jackpine warbler;
- increase soil productivity by releasing and recycling nutrients in litter and undergrowth;
- prepare soil for germination of some seeds;
- activate heat-dependent seed varieties, such as lodgepole pines, jackpine, black spruce;
- contribute to an "edge effect," providing a greater variety of food and shelter sources for some species of wildlife; and
- open up habitat, generating new growth, diversity and abundance of food plants, such as for large herbivores.

Materials:
For the murals: art supplies, butcher paper for mural display.

For the field investigation: soil analysis equipment (e.g., pH testing paper), containers for soil samples, plant and animal identification guides for fieldwork; OR classroom speaker; OR access to library and other reference materials.

Procedure:
Forest Fire Mural:

1. Begin the activity with a discussion of forest fires. Students' reactions may be negative at first. Point out that while the effects of fire may be detrimental to some wildlife species, fire may benefit other species of wildlife.

2. Brainstorm possible positive and negative effects of forest fires. Keep the list of brainstorm ideas posted for the students' reference.

3. Using the brainstorm list as a beginning point, have the students find out more about forest fires. Possible topics for further investigation include:
- how fires affect plants (both understory plants and trees)
- how do fires affect animals (both initially and later)
- how do weather conditions affect fire behavior

4. Once any necessary research has been done, have the students make a mural. The mural should portray changes from before to during and after a fire. Analyze and discuss positive and negative consequences of forest fires. Discuss what forest fires do for the habitat of the endangered Red-cockaded Woodpecker.

The forest fire mural activity may be followed with this suggested field investigation:

1.) Take a field trip to a forest or grassland where it is possible to see areas that have recently been burned, areas burned ten or more years ago, and areas not burned in recorded history. Try to arrange to go with an ecologist or wildlife biologist who can point out and explain some of the similarities and differences among the various areas. (NOTE: If such a trip is not possible, contact a regional forester, state wildlife agency, soil conservation district representative, or other resource person for information on the subject. It may be possible for a representative of the agency to come to the classroom and talk with the students about different circumstances under which fire can be helpful, and harmful, to wildlife-possibly bringing slides or a film on the subject. If neither the field trip nor the visit from a resource person is possible, the students will need to work from library and other reference materials on their own, or agencies may be able to provide you with before and after photographs of such sites.)

2.) If the field trip is possible, prepare students to: a) make and record their observations, e.g., variety and quantity of vegetation, evidence of wildlife, actual sighting or wildlife; and b) with permission of the landholder or manager, take small soil samples in the various areas for testing purposes. Back in class, these soil samples should be tested for structure, organic and inorganic parts, chemical composition, etc.

3.) Ask the students to organize and present the findings of their research. For example, they could chart information including the following:

	Soil Data	Plants	Evidence of Wildlife or Wildlife Observed
Recent Fire Area			
Fire 10-15 Years Ago			
No Recorded Fire			

4.) Ask the students to summarize their findings, including short-term and long-tern effects to wildlife in each area, both positive and negative. They should include in their summary an assessment of the importance of fire in natural systems, as well as of its effectiveness as a management tool. In the situations they studied, ask them to evaluate the role of fire, including its positive and negative consequences. Their findings should include a listing of those situations and forest types in which fire is generally most beneficial, those in which it is most harmful, and those where it has little effect. Ask them to address any limitations to their study; that is any aspects of their research which prevent them from generalizing their findings to all fires affecting wildlife.

5.) Back in the classroom, discuss the effects of forest fires on the endangered Red-cockaded Woodpecker. How does the woodpecker benefit from prescribed burning? What are public attitudes toward fires?

Red Cockaded Woodpecker
Habitat Lap Sit

Objective:
Students will be able to: 1. identify the components of Red-cockaded Woodpecker habitat, 2. recognize how humans and other animals depend on and affect the habitat.

Method:
Students physically form an interconnected circle to demonstrate components of Red-cockaded Woodpecker habitat.

Background:
People and other animals share some basic needs. Every animal needs a place to live. The environment in which an animal lives is called "habitat." An animal's habitat include **food, water, shelter,** and **space** in an **arrangement** appropriate to the animal's needs.

In Texas, habitat for the Red-cockaded Woodpecker is found in the eastern Pineywoods Most woodpeckers make their homes in dead or dying trees, but the Red-cockaded Woodpecker excavates its cavity exclusively in living pines. The cavities are made 20-50 feet above the ground in mature pine trees that are 60 years old or older. The Red-cockaded Woodpecker makes its chamber in the older, non-living heartwood of mature pines. A plate of exposed sapwood (the younger, living portion of the wood) at the cavity's entrance oozes clear, sticky resin that coats the tree and deters snakes and other predators. The heartwood is usually weakened by a heart rot fungus that makes it easier to excavate, but completion of a chamber can still take up to three years.

A cluster site is a stand of trees containing and surrounding the cavity trees where a group of Red-cockaded Woodpeckers nest and roost. A habitat stand is made up of 90 to 145 widely spaced old trees with a grassy understory. The woodpeckers prefer open habitat free of hardwoods and younger pines above 6 feet in height that would impede flight into their homes.

If any components of habitat are missing or are affected significantly, so that the arrangement for the individual animal or population of animals is no longer suitable, there will be an impact. The impact will not necessarily be catastrophic, but it can be. Red-cockaded Woodpeckers and their habitat can be affected by a number of factors. Short timber rotations of 30 to 45 years result in loss of suitable nesting and roosting habitat in mature pines. Cutting in a cluster (leaving only cavity trees) does not allow for cavity tree replacement and leaves the cavity trees susceptible to lightning strikes and weather damage. Removal of dead and dying trees in a cluster area increases competition for Red-cockaded nest cavities by other cavity nesters. Leaving isolated clusters surrounded by harvested areas reduces the area where the bird can forage for insects, seeds, and fruits. The Red-cockaded Woodpecker may abandon cavities where midstory growth impedes the bird's line of flight or where noise and human activity disturb nesting.

The primary objective of this activity is for students to become familiar with the components of Red-cockaded Woodpecker habitat, and to recognize that it is not sufficient for there to be food, water, shelter, and space in order for animals to survive, but that all these components are interrelated and must be in a suitable arrangement.

Materials:
none needed

Procedure:
1. This activity takes very little time-but has a lot of impact! Ask the students to form a circle, holding hands.

2. Walk around the circle, first naming one student as a Red-cockaded Woodpecker. Name the next three students as components of the Red-cockaded Woodpecker's habitat: the first is a mature, old pine; the second is open space; and the third is food (insects, fruits, and seeds).

3. Repeat the process until all the students are involved.

4. When all the students have been designated as a Red-cockaded Woodpecker or as components of the habitat, comment on the fact that they are holding hands. This represents the idea that all things in an ecosystem are interrelated. Briefly discuss the idea of interrelationships.

5. Next, the students should tighten their circle until they are standing shoulder to shoulder facing the inside of the circle.

6. Ask the students to turn toward their right, at the same time taking one step toward the center of the circle. They should be standing close together, with each student looking at the back of the head of the student in front of him or her.

7. Don't panic-this will work! Ask everyone to listen carefully. Students should place their hands on the shoulders of the person in front of them. Students slowly sit down as you count to three. At the point of three, you want the students to sit down - on the knees of the person behind them, keeping their own knees together to support the person in front of them. You then recite the components of the woodpeckers habitat, stressing that all these factors are necessary for the bird to have a suitable habitat.

8. At this point, the students may either fall or sit down. When their laughter has subsided, talk with them about the necessary components of suitable habitat for the Red-cockaded Woodpecker.

9. After the students understand the major point (that specific food, shelter, and space are necessary for the bird's survival, and in the appropriate arrangement, these components comprise a suitable habitat), let them try the circle activity again! This time ask them to hold their lap-sit posture. As the students lap-sit, still representing Red-

cockaded Woodpeckers, pine trees, food, and space in their appropriate arrangement, identify a student who represents a 70 year old pine tree. Say that the tree is cut for lumber. Have the "pine tree" student remove himself or herself from the lap-sit circle, and watch the circle collapse, or at least suffer some disruption in arrangement. You could try this in several ways, removing one or more students from the circle. Conditions could vary; from loss of "space" due to midstory hardwood growth that impedes flight into the nest, to loss of "food" due to competition with other cavity nesters in a limited space. Since the Red-cockaded Woodpecker depends on the availability of old pines, food, and space, in their appropriate arrangement, "removal" of any will have an impact.

10. Ask the students to talk about what this activity means to them. Ask them to summarize the main ideas of the lesson. They could include: a) food (water), shelter, and space, in their appropriate arrangement is called habitat; b) the Red-cockaded Woodpecker depends on its specific habitat in the Texas Pineywoods for survival; and c) loss of any of these elements of habitat will have an impact on the bird.

What Would You Do?!

Objective:
Students will be able to better understand the conservation challenges involved in protecting endangered species habitat by considering the Red-cockaded Woodpecker, an endangered bird of the east Texas Pineywoods.

Method:
Students make plans to protect the Red-cockaded Woodpecker and its habitat and then compare their plans to actual recovery efforts.

Materials:
markers, paper

Procedure:
1. On the board, hang or draw a picture of the Red-cockaded Woodpecker's habitat. Review its components including the need for mature, old pines and open space free of midstory vegetation. Discuss challenges to the bird and its habitat, including decrease in quality and quantity of mature old pines the bird uses for nesting due to:

- timber rotations of only 30-45 years, while the Red-cockaded Woodpecker nests and roosts in 60-70+ year old pines,
- cutting of trees around cavity trees reduces the area where the birds forage and does not leave trees for cavity replacement,
- surrounding isolated habitat with harvested area reduces foraging area and leaves the woodpecker more susceptible to predators,
- increasing competition for Red-cockaded Woodpecker nest cavities by removing the dead and dying trees that other woodpeckers use for their cavities,
- cutting dominant trees around cavity trees leaves the cavity trees in danger of lightning strikes and wind damage,
- careless use of pesticides that may poison the birds or reduce their food supply below the amount needed for successful reproduction, and
- noise and activity of forestry operations, campers, roads and trails may disrupt nesting success.

2. Divide the students into groups of three or four. Ask them to brainstorm and then outline their best plan on paper to help overcome some of the challenges to the Red-cockaded Woodpecker and its habitat. Remind them that the plan needs to show ways in which the Red-cockaded Woodpecker, other pineywoods animals, and human activities can survive and coexist.

3. The groups should present their plans to the other students. As a class you can discuss why the plans could or could not work. Discuss compromises and combine the best ideas into a class-generated recovery plan.

4. After the activity, the students should better understand the challenge of devising a recovery plan for an endangered species. Discuss some of the recovery efforts that are proceeding for the bird in Texas and compare these to the students' plans.

Currently in Texas, efforts are underway to create corridors of continuous habitat or chains of high quality habitat islands between populations of Red-cockaded Woodpeckers to facilitate exchange of birds and enhance opportunities for reproduction. The bird's populations are increasing as a result of habitat improvements, including **prescribed burning** in areas to remove midstory growth that impedes the birds' line of flight to their nests. **Artificial nest box cavities** are placed on the inside of trees where suitable natural cavities are limited. A plate around the entrance of artificial and natural cavities can prevent the entrance of other cavity-nesters (larger birds can't get in). Finally, in a technique called **augmentation,** young females and males are moved to areas with single birds in an effort to start new clusters of Red-cockaded Woodpeckers. Conservation and habitat management, providing information to landowners and the public, and monitoring woodpecker populations, are all important parts of the recovery process.

THE STORY OF THE RED-COCKADED WOODPECKER

Read the following story to learn about the Red-cockaded Woodpecker. The words in black capital letters are hidden in the wordfind. Can you find them? Good luck!

The **RED-COCKADED WOODPECKER** lives in the **PINEYWOODS** of east **TEXAS**. This woodpecker is **SPECIAL** because it is the only woodpecker that makes its home in **LIVING PINE TREES**. The bird chooses areas of **SIXTY** year old and older pines that are **SPACED** far apart. One reason the Red-cockaded Woodpecker is **ENDANGERED** is because these large, **MATURE** pine trees have been cut for **TIMBER**.

It takes one to three years for the woodpecker to make its **NESTING** cavity in the heartwood of mature pines. **HEARTWOOD** is the older, non-living, inner portion of the tree's wood. Heartwood is very **HARD**. **SAPWOOD** is the younger, living wood just under the tree's bark. The woodpecker exposes a **PLATE** of sapwood around the entrance to its **CAVITY**. The sapwood **OOZES** resin that **COATS** the tree around the entrance. The **STICKY RESIN** keeps **PREDATORS**, such as **SNAKES**, away from the woodpecker's home.

WORDFIND

E N B S N A K E S I G U C H A E P
L S E T W X I O T J A V E Y K D O
A Y T R E W O D I D E R S U N M L
S C A L I G N E C O A T S E D A F
P I R N O T E C K A H I Q D A T N
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O L N T I N G Y E S T A L M A T U R E Y H A R D D S

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Read the following story to learn about the Red-cockaded Woodpecker. The words in black capital letters are hidden in the wordfind. Can you find them? Good luck!

The **RED-COCKADED WOODPECKER** lives in the **PINEYWOODS** of east **TEXAS**. This woodpecker is **SPECIAL** because it is the only woodpecker that makes its home in **LIVING PINE TREES**. The bird chooses areas of **SIXTY** year old and older pines that are **SPACED** far apart. One reason the Red-cockaded Woodpecker is **ENDANGERED** is because these large, **MATURE** pine trees have been cut for **TIMBER**.

It takes one to three years for the woodpecker to make its **NESTING** cavity in the heartwood of mature pines. **HEARTWOOD** is the older, non-living, inner portion of the tree's wood. Heartwood is very **HARD**. **SAPWOOD** is the younger, living wood just under the tree's bark. The woodpecker exposes a **PLATE** of sapwood around the entrance to its **CAVITY**. The sapwood **OOZES** resin that **COATS** the tree around the entrance. The **STICKY RESIN** keeps **PREDATORS**, such as **SNAKES**, away from the woodpecker's home.

WORDFIND

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      S N A K E S
            T
            I
S           C O A T S
P           K
E L         Y     O
C I   H E A R T W O O D
I V         E     Z       P L A T E
A I         S P A C E D
L N   C     I     S   P I N E Y W O O D S
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  I   I         E N D A N G E R E D    R
  N   T                       X       E
  E   Y                       A       D
  T       S                   S       A
  R E D C O C K A D E D W O O D P E C K E R   T
  E       P           T               O
  E       W           I               R
  S       O   S I X T Y   M           S
          O               B
N E S T I N G   D        M A T U R E  H A R D
                            E
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Suggested for grades 6 and 7

Red-cockaded Woodpecker Math Activity

Table 1. Numbers of Red-cockaded Woodpeckers found during 1982 and in 1990 for each state where Red-cockaded Woodpeckers live.

State	1982	1990	(1) Change	(2) % of total
Florida	3408	3348		
Louisiana	2598	1392		
South Carolina	2583	1845		
North Carolina	2103	1395		
Georgia	1743	1908		
Arkansas	867	396		
Texas	864	795		
Mississippi	690	462		
Alabama	603	471		
Oklahoma	93	45		
Virginia	36	15		
Kentucky	24	12		
Tennessee	18	3		
TOTAL	15,630	12,087		

1. Determine the change in numbers of Red-cockaded Woodpeckers between 1982 and 1990 for each state. Fill in column 1 in the table above.
   a. Which state had the greatest decline in woodpeckers between 1982 and 1990?
   b. Did any state have an increase in numbers of Red-cockaded Woodpeckers? If so, which one.
   c. What was the change in Texas?
   d. What was the total change in numbers of woodpeckers for all states between 1982 and 1990?

2. Calculate the percent of total birds found in each state during 1990. Fill in column 2 in the table above. Round your numbers to the nearest tenth.
   a. Which 5 states combined had over 81% of the estimated total U.S. population of Red-cockaded Woodpeckers?
   b. What percent of the estimated total U.S. population of Red-cockaded Woodpeckers is found in Texas?

Prepared by
Wildlife Diversity Program
Texas Parks and Wildlife

PWD LF W7000-027 (5/99)

Suggested for grades 6 and 7

Red-cockaded Woodpecker Math Activity

Answers:

1.	Florida	- 60
	Louisiana	-1206
	South Carolina	- 738
	North Carolina	- 708
	Georgia	+165
	Arkansas	- 471
	Texas	- 69
	Mississippi	- 228
	Alabama	- 132
	Oklahoma	- 48
	Virginia	- 21
	Kentucky	- 12
	Tennessee	- 15
	TOTAL	-3543

1a. Louisiana had the greatest decline (-1206) in Red-cockaded Woodpeckers.
1b. Yes, the population in Georgia increased by about 165 birds.
1c. The population in Texas decreased by about 69 birds.
1d. The total numbers of birds for all states decreased by 3543 birds between 1982 and 1990.

2.	Florida	27.7
	Louisiana	11.5
	South Carolina	15.3
	North Carolina	11.5
	Georgia	15.8
	Arkansas	3.3
	Texas	6.6
	Mississippi	3.8
	Alabama	3.9
	Oklahoma	0.4
	Virginia	0.1
	Kentucky	0.1
	Tennessee	<0.1

2a. The states of Florida, Louisiana, South Carolina, North Carolina, and Georgia contain over 81% of the known populations of Red-cockaded Woodpeckers.
2b. About 6.6% of the total estimated U.S. population of Red-cockadedWoodpeckers is found in Texas.

PWD LF W7000-027 (5/99)

Suggested for grades 8-10

Red-cockaded Woodpecker Math Activity

Table 1. Numbers of known clusters of active cavity trees in the early 1980's and in 1990 for each state where Red-cockaded Woodpeckers are foun d. These are actual numbers based on research data. Active clusters of cavity trees are areas where a number cavity trees near one another are currently being used by Red-cockaded Woodpeckers.

State	Early 1980s	1990	(1) Change	(2) % of change	(3) % of all sites in 1990
Florida	1136	1116			
Louisiana	866	464			
South Carolina	861	615			
North Carolina	701	465			
Georgia	581	636			
Arkansas	289	132			
Texas	288	265			
Mississippi	230	154			
Alabama	201	157			
Oklahoma	31	15			
Virginia	12	5			
Kentucky	8	4			
Tennessee	6	1			
TOTAL	5210	4029			

1. Determine the change in clusters of active cavity trees between the early 1980's and 1990 for each state. Fill in column 1 in the table above.

   a. Which state had the greatest decline in active clusters between the early 1980's and 1990?
   b. Did any state have an increase in numbers of active clusters? If so, which one.
   c. What was the change in Texas?
   d. What was the total change in active clusters for all states between the early 1980's and 1990?

2. Calculate the percent change in active clusters for each state. Fill in column 2 in the table above.

   a. Which state had the largest percent decline?
   b. Which state had the lowest percent decline?
   c. Did any state have a percent increase? If so, which one.

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Suggested for grades 8-10

Red-cockaded Woodpecker Math Activity

3. Using the data for 1990, calculate for each state the percentage of total active cavity tree clusters. Fill in column 3 in the table above.

   a. Which state has the largest percent of active clusters?
   b. What percent of all active clusters are found in Texas?
   c. What is the total percent of active clusters found in the five states with the highest Red-cockaded Woodpecker populations?

4. To determine the numbers of Red-cockaded Woodpeckers, biologists count the number of active clusters of cavity trees and multiply by the average number of Red-cockaded Woodpeckers in a clan or family group. If the average family size is 3, what was the estimated population of Red-cockaded Woodpeckers in Texas in 1990?

Prepared by
Wildlife Diversity Program
Texas Parks and Wildlife

PWD LF W7000-027 (5/99)

Suggested for grades 8-10

Red-cockaded Woodpecker Math Activity

Answers:

1.

Florida	- 20
Louisiana	-402
South Carolina	-246
North Carolina	-236
Georgia	+ 55
Arkansas	-157
Texas	- 23
Mississippi	- 76
Alabama	- 44
Oklahoma	- 16
Virginia	- 7
Kentucky	- 4
Tennessee	- 5

1a. Louisiana had the greatest decline in active clusters.
1b. Yes, Georgia had an increase in the number of active clusters.
1c. Texas had a decrease of 23 active clusters.
1d. The total change for all states was -1181.

2.

Florida	- 2%
Louisiana	- 46%
South Carolina	- 29%
North Carolina	- 34%
Georgia	+ 9%
Arkansas	- 54%
Texas	- 8%
Mississippi	- 33%
Alabama	- 22%
Oklahoma	- 52%
Virginia	- 58%
Kentucky	- 50%
Tennessee	- 83%

2a. Tennessee had the largest percent decline at -83%.
2b. Florida had the lowest percent decline at -2%.
2c. Georgia had a 9% increase.

3.

Florida	28
Louisiana	11
South Carolina	15
North Carolina	11
Georgia	16
Arkansas	3
Texas	7
Mississippi	4
Alabama	4
Oklahoma	<1
Virginia	<1
Kentucky	<1
Tennessee	<1

3a. Florida has the largest percent of total active clusters for all states.
3b. Seven percent of all active clusters are found in Texas.
3c. A total of 81% of all active clusters of Red-cockaded Woodpecker cavity trees are found in Florida, Louisiana, South Carolina, North Carolina, and Georgia.

4. For Texas in 1990, the estimated number of active clusters of cavity trees was 265. Therefore, 265 clusters X 3 birds/family group=an estimated population of 795 birds.

PWD LF W7000-027 (5/99)

TEXAS PARKS AND WILDLIFE

The endangered Red-cockaded Woodpecker and modern forestry in Texas: Living in harmony

A booklet by:

Texas Partners in Flight, Texas Parks and Wildlife,
U.S. Fish and Wildlife Service,
U.S. Forest Service, and the Texas Forest Service

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For more information on all the woodpeckers, call Texas Partners In Flight (TX PIF) at 512/389-4970 or e-mail: clifford.shackelford@tpwd.state.tx.us for a free copy of *The Woodpeckers of the Eastern Texas Pineywoods* (2nd edition, 1997) by Melissa Parker (TPW) and Cliff Shackelford (TX PIF).

This booklet was written by Cliff Shackelford (TX PIF) and Jeff Reid (USFWS). Landowner Incentive Program information was provided by Ricky Maxey (TPW). Printing was made possible through additional partnerships with the U.S. Forest Service and the Texas Forest Service. We thank the following reviewers: Melissa Parker, Dick Conner, Ralph Costa, Dawn Carrie, and the Wildlife Diversity Program at TPW in Austin.

Red-cockaded Woodpecker

PHOTO BY R. N. CONNER, USFS

Adult at the nest cavity. Notice the sticky resin on trunk of this live pine.

Adult captured, banded and safely released by licensed biologists for monitoring purposes.

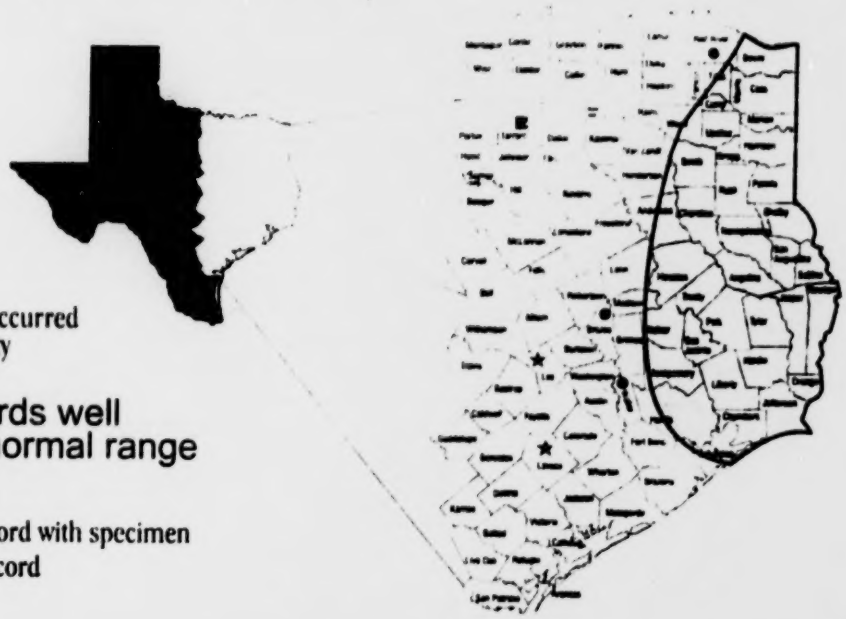
PHOTO BY CLIFF SHACKELFORD, TX PIF

The Red-cockaded Woodpecker, or RCW, is one of eight species of woodpeckers that occur in East Texas. It is a small black-and-white bird about the size of a cardinal.

The red patches, or "cockades," on either side of the head on males is rarely seen as they usually conceal the red until excited or agitated. The observer usually needs binoculars to see the red. This woodpecker usually does not frequent urban settings and is not a familiar backyard species. It is not likely to be observed at a bird feeder unlike the Downy and Red-bellied woodpeckers, for example.

Historic Range of RCWs in Texas

from Oberholser, H.C. 1974. The Bird Life of Texas. Univ. of Texas Press, Austin.



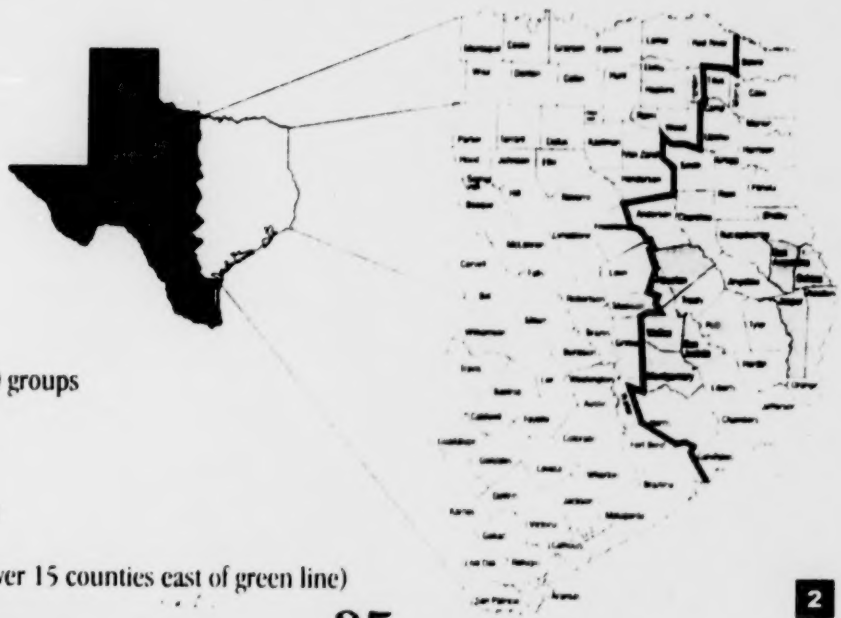
☐ Historically occurred with regularity

Historic records well outside the normal range

- • Sight report
- ★ Breeding record with specimen
- ■ Specimen record

Present Range of RCWs in Texas (1998)

from known locations on private, state, and federal lands



- ☐ More than 10 groups
- ☐ 3-10 groups
- ☐ 1 or 2 groups
- ☐ Extirpated (over 15 counties east of green line)

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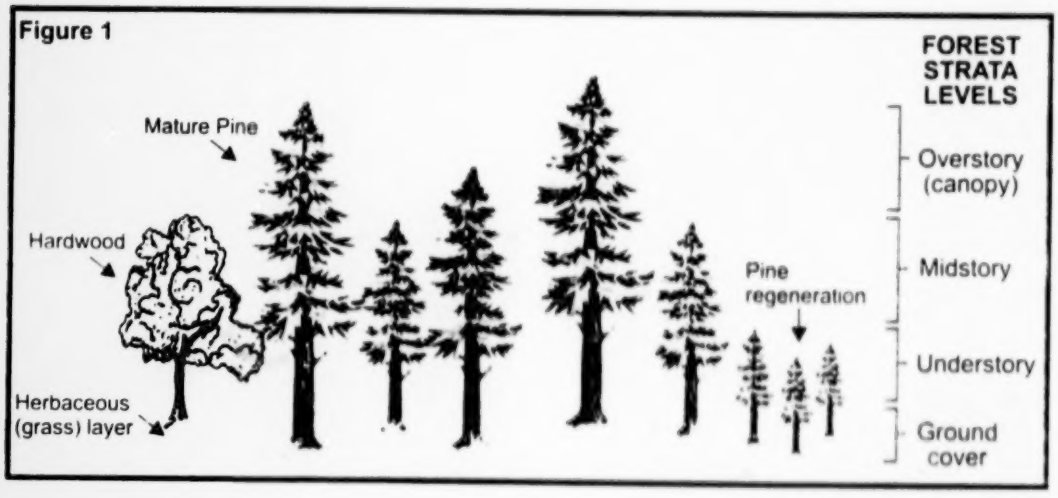
The RCW adapted to open, mature pine forests throughout the southeastern U. S. Although this open, grassy condition was historically maintained by lightning-created fire, the early American Indians also used fire as a means for creating this forest condition (Figure 1).

Figure 1



By maintaining the open condition of these pine forests, sunlight reached the forest floor which produced a diverse herbaceous, vegetative ground cover that supported important sources of food for the Indians such as white-tailed deer, northern bobwhite and Eastern wild turkey. The historic, open, fire-maintained pine stands are very "park-like," and are sometimes called "pine savannahs" or "pine sandhills." These sites usually occur in very deep sandy sites along hillside ridges, but they can also occur elsewhere on the landscape like in wetter, clay soil types.

PHOTO BY CLIFF SHACKELFORD, TX PIF

Open, mature longleaf pine stand showing signs of recent fire. Notice the grassy understory, lack of hardwoods, and charred pine trunks. Less than 4% of this habitat type remains in the southeastern U. S.

The suppression of fire in this century has allowed a thick mass of woody plant species to grow, reducing habitat for nesting bobwhite and turkeys, as well as the preferred habitat for RCWs. When the woody plants grow to a height of 15 feet or more (termed midstory), RCWs usually abandon the site (Figure 2).

Figure 2

A unique characteristic of the RCW is that it is the only North American woodpecker species that excavates its cavity exclusively in living pine trees. To make cavity excavation easier, the bird typically chooses old pines (80+ years) infected with a fungus called ***heart rot***, which decays the inner wood of the tree.

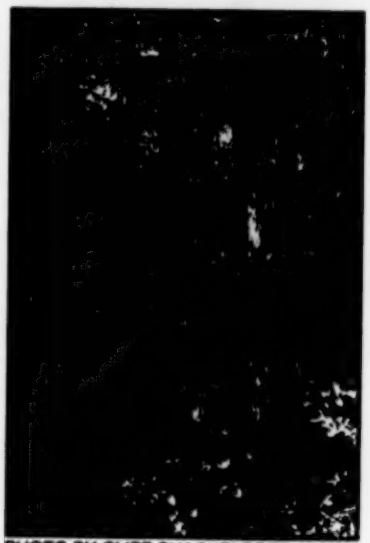


PHOTO BY CLIFF SHACKELFORD, TX PIF

A pine stand with dense hardwoods due to the lack of fire.

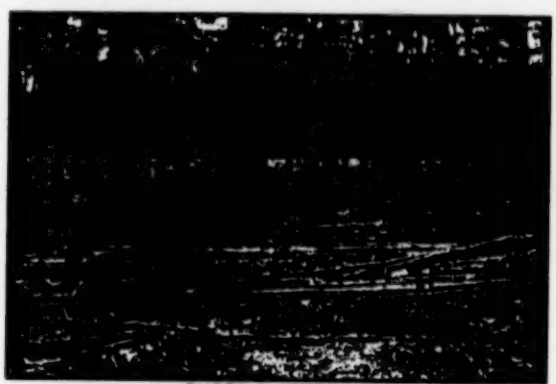


PHOTO BY CLIFF SHACKELFORD, TX PIF

When fire is not an option, here is an example of recently accomplished mechanical midstory removal and thinning, a means of opening a previously dense stand.

WHY IS IT VULNERABLE AND WHY IS IT ENDANGERED? In simplistic terms, timber harvesting of the southern pine forests has resulted in a loss of mature pine forest habitat, habitat that the RCW needs for food and shelter. Currently, much of the forests in East Texas are managed for fiber production which usually means a short rotation age. Basically, the trees are too young and too small for RCWs to excavate cavities for roosting and nesting, and the stands are usually too dense for RCWs to search for insects on which to feed. In many pine forests where sawtimber-sized trees are available for the RCWs to excavate cavities, the hardwood midstory is typically so dense that the RCW avoids these areas.

Scientists believe that RCWs adapted to excavating cavities in live pine trees to take advantage of the sappy resin which flows from wounds in the tree (see photo on page 1). The RCW pecks resin wells on the trees in which they have excavated cavities. The resulting resin "barrier" effectively prevents predators such as rat snakes, which do climb pine trees as they search for food, from climbing the trees. However, an abundance of midstory hardwoods can allow predators to reach an RCW cavity tree via hardwood limbs. The rat snake, for example, can climb the hardwood to reach the cavity and eat RCW eggs or young. This is one of the reasons why it is believed that hardwood midstory in a pine stand causes the RCW to abandon their cavity trees. If they don't abandon these areas, they might end up in the stomach of a rat snake!

Historical accounts of the pine forests in East Texas depict large old trees, many RCWs and an open, grassy understory among a sparse pine overstory (canopy). It has been said: "Once upon a time, you could ride a horse at full gallop through the pine forests of East Texas." In modern times, that would be virtually impossible due to the thick brush. It is believed that natural, frequent fires burned the forests of East Texas. These fires promoted the open, grassy character of the forest, while reducing most species of hardwoods in the uplands where the RCW lived. The harvesting of these forests and the lack of frequent fires have essentially changed the character of the forests, causing many species dependent on this fire-maintained ecosystem to decline. Among the declining species are: RCW, Bachman's sparrow, Eastern wild turkey, American kestrel, northern bobwhite, Texas trailing phlox and Louisiana pine snake. (See p. 8 for more information.)

HOW CAN WE BRING THEM BACK? Many private landowners view their forests, or the pine timber on their land, as money in the bank. They look at the investment of time and money, and fear that an endangered species such as the RCW will show up on their land and essentially devalue their investment. In Texas, RCW recovery is designated on Federal lands owned and managed by the U.S. Forest Service. In reality, RCW recovery in Texas will depend upon assistance from the private landowners adjacent to these forests since the current ownership is essentially arranged in a checkerboard pattern. This fact concerns most private landowners with timber near the National Forests in Texas.

That is why state and federal authorities recently developed a plan to give these private landowners "peace of mind." This Plan is known as the **Regional Habitat Conservation Plan** (hereafter, the Plan) for the RCW on Private Lands in the East Texas Pineywoods. Essentially, private landowners who sign up under the Plan are protected from future RCW occupation of their land in return for growing large sawtimber in East Texas utilizing established forest management practices such as thinning, prescribed burning and selective harvesting. These practices increase the value of the timber while giving the RCW a temporary place to live. This will benefit recovery efforts on federal lands because the net result will be more woodpeckers to inhabit the managed RCW habitat on Forest Service lands.

The landowner will also benefit from knowing that their timber investment is protected. This protection should result in larger and older trees across the landscape which should be worth more money when harvested. Through cooperative efforts such as the Plan and restoration efforts on Texas National Forests, the future of this resilient bird is looking bright.

For more information on this Plan, please contact TPW in Nacogdoches at 409/560-6863, the USFWS in Lufkin at 409/639-8546 or the TFS in Lufkin at 409/639-8180.

Texas Parks and Wildlife also provides a Landowner Incentive Program which provides matching funds for conservation projects. Read on for more details.

WHAT IS THE LANDOWNER INCENTIVE PROGRAM? The Wildlife Diversity Program of Texas Parks and Wildlife provides a challenge cost-share program for landowners called the **Landowner Incentive Program (LIP)** which provides matching funds for conservation projects for endangered, threatened and rare species, including the RCW. The maximum funding for individual projects is $10,000 per year. The landowner must provide at least 20% of the total cost of the project. The landowner share can include labor and materials. Although there are no project duration limitations, projects with management actions which can be documented within 5 years are preferred.

This program could easily be applied to management programs for RCW conservation on private lands. LIP funding could be utilized to perform survey and assessment, monumentation of cavity trees, installation of restrictor plates, installation of artificial cavity inserts, midstory control and removal (including thinning of unmerchantable timber), prescribed burning, restoration of longleaf pine, and any other management action lending to conservation of RCW.

Applications for LIP grants are received and reviewed semi-annually by TPW in January and July of each year. For more information on this program, contact the Regional Endangered Species Biologist, P.O. Box 4655, SFA Station, Nacogdoches, Texas 75962, or by phone at 409/564-0234.

Check out the Web

www.tpwd.state.tx.us/nature/birding/pif/txpif.htm

www.tpwd.state.tx.us

www.fws.gov

TEXAS FOREST SERVICE txforestservice.tamu.edu

www.fs.fed.us

Partners in Flight was formed to address the conservation needs of declining bird species. Federal and state government agencies, non-governmental conservation organizations, communities and conservation-minded corporations, landowners, and other businesses, have joined together in an international effort to address these declines. Together, we are working to understand the ecology and natural history of all birds in the Western Hemisphere, while also discovering the causes of their vulnerability. Our main goal is to implement actions needed to assure that these valuable species continue to occur in healthy and productive populations into the future.

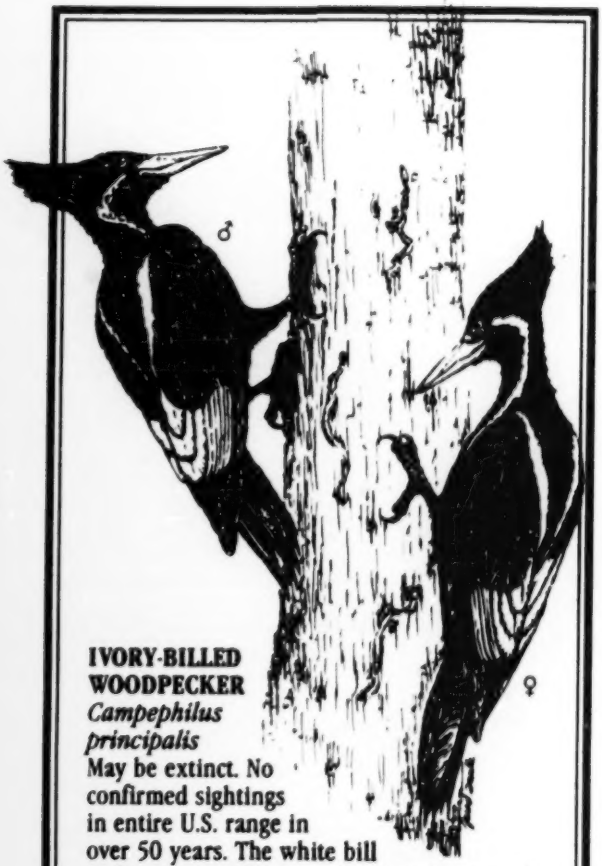
In addition to the RCW, many other species are becoming critically threatened or endangered. They, too, are experiencing serious declines because they depend on the same forest type (or habitat) as the RCW. Management that benefits this woodpecker will benefit a wide variety of other species as well. Therefore, this is an example of "ecosystem-wide management," not "single-species management." The RCW is an indicator of a healthy, upland pine forest ecosystem maintained by frequent, but mostly low-intesity fires. A few other bird species that will benefit include nesting Eastern wild turkey, northern bobwhite, red-headed woodpecker, northern flicker, American kestrel, year-round Bachman's sparrow, year-round Brown-headed Nuthatch and Red-headed Woodpecker, and wintering Henslow's sparrow. There is a long list of plants and animals that also depend on these fire-maintained pine forests – over 70 species that we know of, too many to list here.

If you would like to visit a site in Texas with Red-cockaded Woodpeckers, please contact one of the following:

W. G. Jones State Forest in Conroe *(Montgomery County)*	409/273-2261
Davy Crockett National Forest in Ratcliff *(Trinity and Houston counties)*	409/655-2299
Sam Houston National Forest in New Waverly *(San Jacinto, Walker, and Montgomery counties)*	888/361-6908
Angelina National Forest in Lufkin *(Angelina, Nacogdoches, San Augustine, and Jasper counties)*	409/639-8620
Sabine National Forest in Hemphill *(Sabine and Shelby counties)*	800/340-0917

4200 Smith School Road
Austin, Texas 78744

PWD BK W7000-361 (6/99)



IVORY-BILLED WOODPECKER
Campephilus principalis
May be extinct. No confirmed sightings in entire U.S. range in over 50 years. The white bill and extensive white on the wing distinguish it from the Pileated woodpecker. Requires a continual supply of dead or dying trees for foraging. Rediscovered in Cuba in 1986 but not seen after 1990. The few individuals seen there in the 1980's could have been the last individuals to exist in the world. (19½")

TEXAS PARKS & WILDLIFE

Texans in Flight
Texas Amigos de las Aves

4200 Smith School Road
Austin, Texas 78744

PWD BR R3000-015 (8/97)
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TEXAS PARKS AND WILDLIFE

The Woodpeckers of the Eastern Texas Pineywoods

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THE WOODPECKERS OF THE EASTERN TEXAS PINEYWOODS

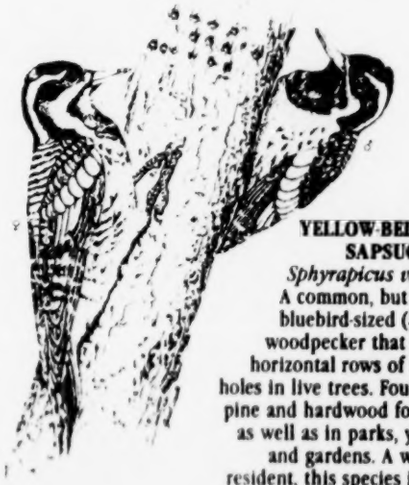
The eastern Texas Pineywoods supports more species of woodpeckers than any other region of the state. Currently, eight species of this unique family of birds exist in the Pineywoods. The Ivory-billed woodpecker once lived in eastern Texas, bringing the list up to nine. In general, woodpeckers require older trees and snags (dead trees) for feeding and nesting. Conservation of our mature forests and urban woodlots will ensure habitat for these important birds, as well as other species of wildlife dependent on their cavities.

HAIRY WOODPECKER
Picoides villosus
An almost robin-sized (9¼") black and white woodpecker with a white back and a fairly long bill. Uncommon in both open and dense woods, especially along the edges.

DOWNY WOODPECKER
Picoides pubescens
A sparrow-sized (6¾") woodpecker that is distinguished from the identical Hairy Woodpecker by its smaller size and shorter bill. Very common in suburbs, orchards, parks and woods.

RED-COCKADED WOODPECKER
Picoides borealis
This endangered woodpecker is found in old, open pine forests. Creates nest cavities in living pine trees. Holes for pine resin to ooze are created in cavity trees to prevent snakes from climbing the tree. Males have a small red patch of feathers located near the ear (or cockade), which is rarely seen in the field. Also called RCW, this species is about the size of an eastern bluebird (8½").

NORTHERN FLICKER
Colaptes auratus
A large, jay-sized (12½") brownish woodpecker with a white rump and flashes of yellow in wings and tail. Nests in large trees in open forests, parks, and suburban areas. Spends much of its time searching for food on the ground. Prefers hardwood forests and lawns in the fall and winter.



YELLOW-BELLIED SAPSUCKER
Sphyrapicus varius
A common, but quiet bluebird-sized (8½") woodpecker that drills horizontal rows of small holes in live trees. Found in pine and hardwood forests, as well as in parks, yards, and gardens. A winter resident, this species is not here in the summer.

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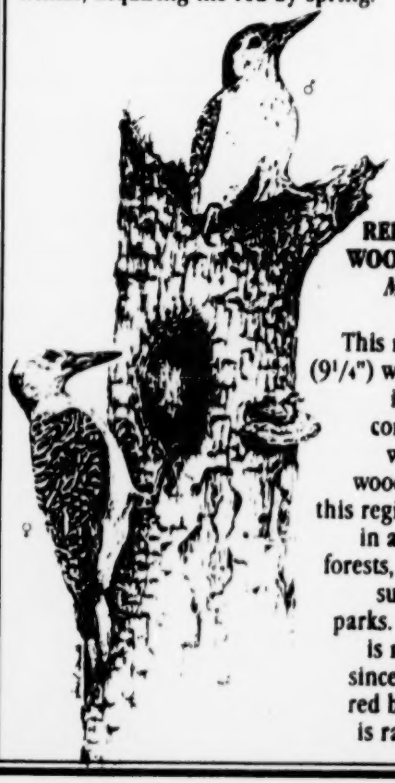
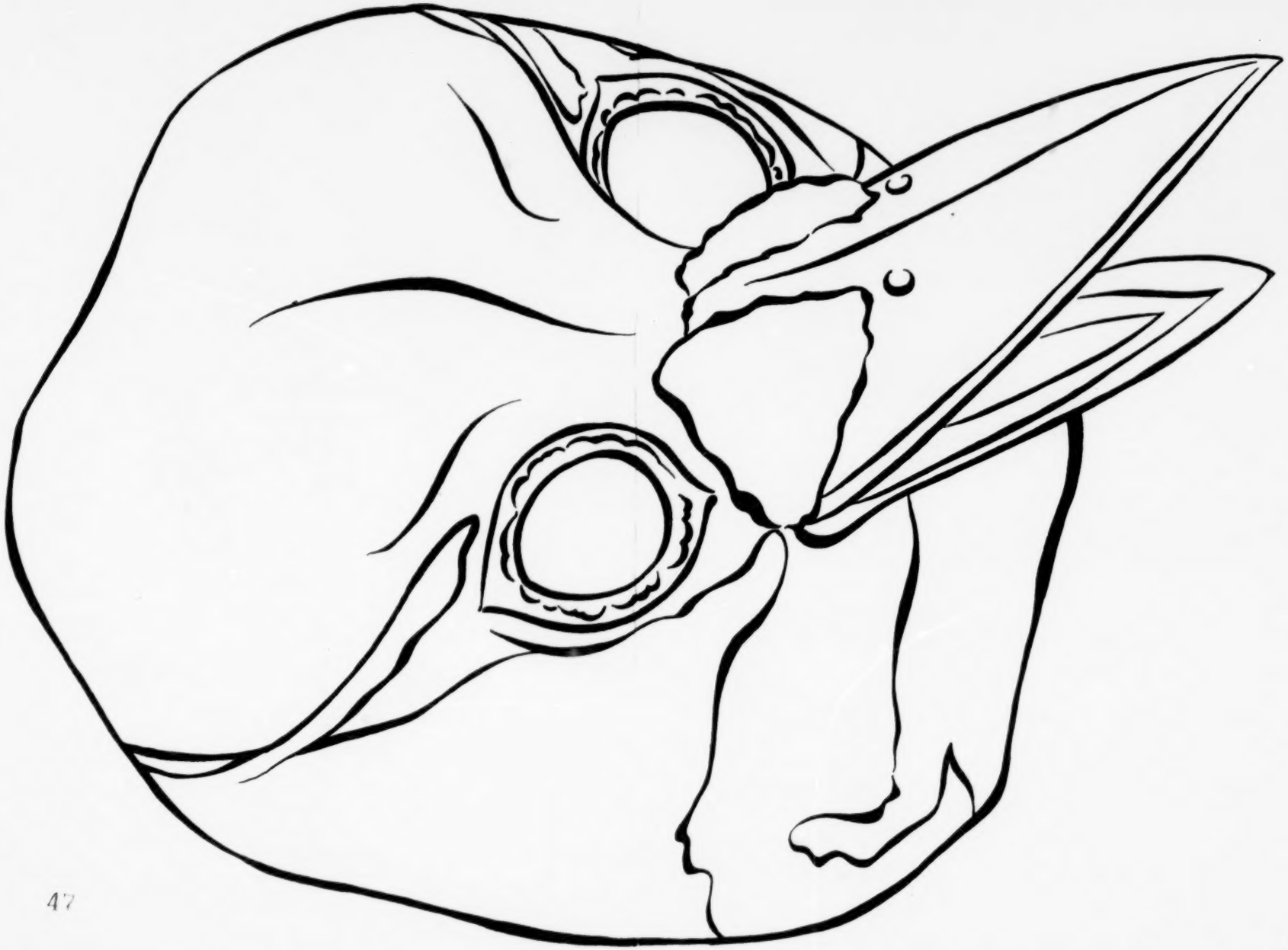
RED-HEADED WOODPECKER
Melanerpes erythrocephalus
A robin-sized (9¼") black and white woodpecker with an entire red head. Found in the spring and summer in open forests, such as golf courses, parks, and farms. In winter, can be found in bottomland hardwoods in search of acorns. Young birds have gray heads in fall and winter, acquiring the red by spring.



RED-BELLIED WOODPECKER
Melanerpes carolinus
This robin-sized (9¼") woodpecker is the most common and widespread woodpecker in this region. Found in all types of forests, as well as suburbs and parks. The name is misleading since the small red belly patch is rarely seen.

PILEATED WOODPECKER
Dryocopus pileatus
A large (16½"), noisy, crow-sized black woodpecker with white neck stripes and chin. The prominent red crest and white under-wing linings aid in identification. Prefers extensive forests with mature trees for nesting, but is also found in smaller woodlots, yards and parks. Colloquial names include: Indian hen, log-god or by-god.



47

48

Red-cockaded Woodpecker

Picoides borealis

Date of Listing: Endangered, 1970
Size: 8 inches long
Diet: Insects found under the bark and along the branches of pine trees
Where It Lives: Open pine forests with large, widely-spaced older trees
Reproduction: 2 to 4 eggs
Population Numbers: 1994 post-breeding estimate of 925 birds in Texas

Red-cockaded Woodpeckers sleep (roost) and nest in cavities (holes) of live pine trees. Cavities are built only in large, old pines. These woodpeckers live in family groups which may include the male and female, their chicks, and young adult "helpers." These "helpers" help build cavities and care for the chicks. The birds peck the bark around the entrance to get the sap (resin) flowing around the hole. The sticky sap keeps predators like snakes away from the nest cavity.

Red-cockaded Woodpeckers are endangered because the open forests with big, old pine trees have been replaced by forests with younger, smaller pines. Also, periodic natural fires, which historically kept the pinewoods open, have been suppressed since settlement. Periodic fire is needed to control the brushy understory and keep the pinewoods open.

Range: Pineywoods of East Texas

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